SmartSTACK
ELS100-S24TX2M
FAST ETHERNET SWITCH

USER GUIDE

CABLETRON SYSTEMS

Only qualified personnel should perform installation procedures.

NOTICE

Cabletron Systems reserves the right to make changes in specifications and other information contained in this document without prior notice. The reader should in all cases consult Cabletron Systems to determine whether any such changes have been made.

The hardware, firmware, or software described in this manual is subject to change without notice.

IN NO EVENT SHALL CABLETRON SYSTEMS BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING BUT NOT LIMITED TO LOST PROFITS) ARISING OUT OF OR RELATED TO THIS MANUAL OR THE INFORMATION CONTAINED IN IT, EVEN IF CABLETRON SYSTEMS HAS BEEN ADVISED OF, KNOWN, OR SHOULD HAVE KNOWN, THE POSSIBILITY OF SUCH DAMAGES.

FCC NOTICE

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment uses, generates, and can radiate radio frequency energy and if not installed in accordance with the operator's manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

WARNING: Changes or modifications made to this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

INDUSTRY CANADA NOTICE

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

VCCI NOTICE

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

　　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

CABLETRON SYSTEMS, INC.
PROGRAM LICENSE AGREEMENT

IMPORTANT: **THIS LICENSE APPLIES FOR USE OF PRODUCT IN THE FOLLOWING GEOGRAPHICAL REGIONS:**

CANADA
MEXICO
CENTRAL AMERICA
SOUTH AMERICA

BEFORE OPENING OR UTILIZING THE ENCLOSED PRODUCT, CAREFULLY READ THIS LICENSE AGREEMENT.

This document is an agreement ("Agreement") between You, the end user, and Cabletron Systems, Inc. ("Cabletron") that sets forth your rights and obligations with respect to the Cabletron software program ("Program") in the package. The Program may be contained in firmware, chips or other media. UTILIZING THE ENCLOSED PRODUCT, YOU ARE AGREEING TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT, WHICH INCLUDES THE LICENSE AND THE LIMITATION OF WARRANTY AND DISCLAIMER OF LIABILITY. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, RETURN THE UNOPENED PRODUCT TO CABLETRON OR YOUR DEALER, IF ANY, WITHIN TEN (10) DAYS FOLLOWING THE DATE OF RECEIPT FOR A FULL REFUND.

IF YOU HAVE ANY QUESTIONS ABOUT THIS AGREEMENT, CONTACT CABLETRON SYSTEMS +1-603-332-9400. Attn: Legal Department.

1.   LICENSE. You have the right to use only the one (1) copy of the Program provided in this package subject to the terms and conditions of this License Agreement.

You may not copy, reproduce or transmit any part of the Program except as permitted by the Copyright Act of the United States or as authorized in writing by Cabletron.

2.   OTHER RESTRICTIONS. You may not reverse engineer, decompile, or disassemble the Program.

3.   APPLICABLE LAW. This License Agreement shall be interpreted and governed under the laws and in the state and federal courts of New Hampshire. You accept the personal jurisdiction and venue of the New Hampshire courts.

4.   EXPORT REQUIREMENTS. You understand that Cabletron and its Affiliates are subject to regulation by agencies of the U.S. Government, including the U.S. Department of Commerce, which prohibit export or diversion of certain technical products to certain countries, unless a license to export the product is obtained from the U.S. Government or an exception from obtaining such license may be relied upon by the exporting party.

If the Program is exported from the United States pursuant to the License Exception CIV under the U.S. Export Administration Regulations, You agree that You are a civil end user of the Program and agree that You will use the Program for civil end uses only and not for military purposes.

Notice

If the Program is exported from the United States pursuant to the License Exception TSR under the U.S. Export Administration Regulations, in addition to the restriction on transfer set forth in Sections 1 or 2 of this Agreement, You agree not to (i) reexport or release the Program, the source code for the Program or technology to a national of a country in Country Groups D:1 or E:2 (Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Cambodia, Cuba, Estonia, Georgia, Iraq, Kazakhstan, Kyrgyzstan, Laos, Latvia, Libya, Lithuania, Moldova, North Korea, the People's Republic of China, Romania, Russia, Rwanda, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Vietnam, or such other countries as may be designated by the United States Government), (ii) export to Country Groups D:1 or E:2 (as defined herein) the direct product of the Program or the technology, if such foreign produced direct product is subject to national security controls as identified on the U.S. Commerce Control List, or (iii) if the direct product of the technology is a complete plant or any major component of a plant, export to Country Groups D:1 or E:2 the direct product of the plant or a major component thereof, if such foreign produced direct product is subject to national security controls as identified on the U.S. Commerce Control List or is subject to State Department controls under the U.S. Munitions List.

5.   UNITED STATES GOVERNMENT RESTRICTED RIGHTS. The enclosed Product (i) was developed solely at private expense; (ii) contains "restricted computer software" submitted with restricted rights in accordance with section 52.227-19 (a) through (d) of the Commercial Computer Software-Restricted Rights Clause and its successors, and (iii) in all respects is proprietary data belonging to Cabletron and/or its suppliers. For Department of Defense units, the Product is considered commercial computer software in accordance with DFARS section 227.7202-3 and its successors, and use, duplication, or disclosure by the Government is subject to restrictions set forth herein.

6.   EXCLUSION OF WARRANTY. Except as may be specifically provided by Cabletron in writing, Cabletron makes no warranty, expressed or implied, concerning the Program (including its documentation and media).

CABLETRON DISCLAIMS ALL WARRANTIES, OTHER THAN THOSE SUPPLIED TO YOU BY CABLETRON IN WRITING, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE PROGRAM, THE ACCOMPANYING WRITTEN MATERIALS, AND ANY ACCOMPANYING HARDWARE.

7.   NO LIABILITY FOR CONSEQUENTIAL DAMAGES. IN NO EVENT SHALL CABLETRON OR ITS SUPPLIERS BE LIABLE FOR ANY DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS, PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR RELIANCE DAMAGES, OR OTHER LOSS) ARISING OUT OF THE USE OR INABILITY TO USE THIS CABLETRON PRODUCT, EVEN IF CABLETRON HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. BECAUSE SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, OR IN THE DURATION OR LIMITATION OF IMPLIED WARRANTIES IN SOME INSTANCES, THE ABOVE LIMITATION AND EXCLUSIONS MAY NOT APPLY TO YOU.

CABLETRON SYSTEMS SALES AND SERVICE, INC.
PROGRAM LICENSE AGREEMENT

IMPORTANT: **THIS LICENSE APPLIES FOR USE OF PRODUCT IN THE UNITED STATES OF AMERICA AND BY UNITED STATES OF AMERICA GOVERNMENT END USERS.**

BEFORE OPENING OR UTILIZING THE ENCLOSED PRODUCT, CAREFULLY READ THIS LICENSE AGREEMENT.

This document is an agreement ("Agreement") between You, the end user, and Cabletron Systems Sales and Service, Inc. ("Cabletron") that sets forth your rights and obligations with respect to the Cabletron software program ("Program") in the package. The Program may be contained in firmware, chips or other media. UTILIZING THE ENCLOSED PRODUCT, YOU ARE AGREEING TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT, WHICH INCLUDES THE LICENSE AND THE LIMITATION OF WARRANTY AND DISCLAIMER OF LIABILITY. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, RETURN THE UNOPENED PRODUCT TO CABLETRON OR YOUR DEALER, IF ANY, WITHIN TEN (10) DAYS FOLLOWING THE DATE OF RECEIPT FOR A FULL REFUND.

IF YOU HAVE ANY QUESTIONS ABOUT THIS AGREEMENT, CONTACT CABLETRON SYSTEMS +1-603-332-9400. Attn: Legal Department.

1. **LICENSE.** You have the right to use only the one (1) copy of the Program provided in this package subject to the terms and conditions of this License Agreement.

You may not copy, reproduce or transmit any part of the Program except as permitted by the Copyright Act of the United States or as authorized in writing by Cabletron.

2. **OTHER RESTRICTIONS.** You may not reverse engineer, decompile, or disassemble the Program.

3. **APPLICABLE LAW.** This License Agreement shall be interpreted and governed under the laws and in the state and federal courts of New Hampshire. You accept the personal jurisdiction and venue of the New Hampshire courts.

4. **EXPORT REQUIREMENTS.** You understand that Cabletron and its Affiliates are subject to regulation by agencies of the U.S. Government, including the U.S. Department of Commerce, which prohibit export or diversion of certain technical products to certain countries, unless a license to export the product is obtained from the U.S. Government or an exception from obtaining such license may be relied upon by the exporting party.

If the Program is exported from the United States pursuant to the License Exception CIV under the U.S. Export Administration Regulations, You agree that You are a civil end user of the Program and agree that You will use the Program for civil end uses only and not for military purposes.

If the Program is exported from the United States pursuant to the License Exception TSR under the U.S. Export Administration Regulations, in addition to the restriction on transfer set forth in Sections 1 or 2 of this Agreement, You agree not to (i) reexport or release the Program, the source code for the Program or technology to a national of a country in Country Groups D:1 or E:2 (Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Cambodia, Cuba, Estonia, Georgia, Iraq, Kazakhstan, Kyrgyzstan, Laos, Latvia, Libya, Lithuania, Moldova, North Korea, the People's Republic of China, Romania, Russia, Rwanda, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Vietnam, or such other countries as may be designated by the United States Government), (ii) export to Country Groups D:1 or E:2 (as defined herein) the direct product of the Program or the technology, if such foreign produced direct product is subject to national security controls as identified on the U.S. Commerce Control List, or (iii) if the direct product of the technology is a complete plant or any major component of a plant, export to Country Groups D:1 or E:2 the direct product of the plant or a major component thereof, if such foreign produced direct product is subject to national security controls as identified on the U.S. Commerce Control List or is subject to State Department controls under the U.S. Munitions List.

5.   UNITED STATES GOVERNMENT RESTRICTED RIGHTS. The enclosed Product (i) was developed solely at private expense; (ii) contains "restricted computer software" submitted with restricted rights in accordance with section 52.227-19 (a) through (d) of the Commercial Computer Software-Restricted Rights Clause and its successors, and (iii) in all respects is proprietary data belonging to Cabletron and/or its suppliers. For Department of Defense units, the Product is considered commercial computer software in accordance with DFARS section 227.7202-3 and its successors, and use, duplication, or disclosure by the Government is subject to restrictions set forth herein.

6.   EXCLUSION OF WARRANTY. Except as may be specifically provided by Cabletron in writing, Cabletron makes no warranty, expressed or implied, concerning the Program (including its documentation and media).

CABLETRON DISCLAIMS ALL WARRANTIES, OTHER THAN THOSE SUPPLIED TO YOU BY CABLETRON IN WRITING, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE PROGRAM, THE ACCOMPANYING WRITTEN MATERIALS, AND ANY ACCOMPANYING HARDWARE.

7.   NO LIABILITY FOR CONSEQUENTIAL DAMAGES. IN NO EVENT SHALL CABLETRON OR ITS SUPPLIERS BE LIABLE FOR ANY DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS, PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR RELIANCE DAMAGES, OR OTHER LOSS) ARISING OUT OF THE USE OR INABILITY TO USE THIS CABLETRON PRODUCT, EVEN IF CABLETRON HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. BECAUSE SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, OR IN THE DURATION OR LIMITATION OF IMPLIED WARRANTIES IN SOME INSTANCES, THE ABOVE LIMITATION AND EXCLUSIONS MAY NOT APPLY TO YOU.

CABLETRON SYSTEMS LIMITED
PROGRAM LICENSE AGREEMENT

IMPORTANT: **THIS LICENSE APPLIES FOR THE USE OF THE PRODUCT IN THE FOLLOWING GEOGRAPHICAL REGIONS:**

> **EUROPE**
> **MIDDLE EAST**
> **AFRICA**
> **ASIA**
> **AUSTRALIA**
> **PACIFIC RIM**

BEFORE OPENING OR UTILIZING THE ENCLOSED PRODUCT, CAREFULLY READ THIS LICENSE AGREEMENT.

This document is an agreement ("Agreement") between You, the end user, and Cabletron Systems Limited ("Cabletron") that sets forth your rights and obligations with respect to the Cabletron software program ("Program") in the package. The Program may be contained in firmware, chips or other media. UTILIZING THE ENCLOSED PRODUCT, YOU ARE AGREEING TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT, WHICH INCLUDES THE LICENSE AND THE LIMITATION OF WARRANTY AND DISCLAIMER OF LIABILITY. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, RETURN THE UNOPENED PRODUCT TO CABLETRON OR YOUR DEALER, IF ANY, WITHIN TEN (10) DAYS FOLLOWING THE DATE OF RECEIPT FOR A FULL REFUND.

IF YOU HAVE ANY QUESTIONS ABOUT THIS AGREEMENT, CONTACT CABLETRON SYSTEMS +1-603-332-9400. Attn: Legal Department.

1.   LICENSE. You have the right to use only the one (1) copy of the Program provided in this package subject to the terms and conditions of this License Agreement.

You may not copy, reproduce or transmit any part of the Program except as permitted by the Copyright Act of the United States or as authorized in writing by Cabletron.

2.   OTHER RESTRICTIONS. You may not reverse engineer, decompile, or disassemble the Program.

3.   APPLICABLE LAW. This License Agreement shall be governed in accordance with English law. The English courts shall have exclusive jurisdiction in the event of any disputes.

4.   EXPORT REQUIREMENTS. You understand that Cabletron and its Affiliates are subject to regulation by agencies of the U.S. Government, including the U.S. Department of Commerce, which prohibit export or diversion of certain technical products to certain countries, unless a license to export the product is obtained from the U.S. Government or an exception from obtaining such license may be relied upon by the exporting party.

If the Program is exported from the United States pursuant to the License Exception CIV under the U.S. Export Administration Regulations, You agree that You are a civil end user of the Program and agree that You will use the Program for civil end uses only and not for military purposes.

If the Program is exported from the United States pursuant to the License Exception TSR under the U.S. Export Administration Regulations, in addition to the restriction on transfer set forth in Sections 1 or 2 of this Agreement, You agree not to (i) reexport or release the Program, the source code for the Program or technology to a national of a country in Country Groups D:1 or E:2 (Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Cambodia, Cuba, Estonia, Georgia, Iraq, Kazakhstan, Kyrgyzstan, Laos, Latvia, Libya, Lithuania, Moldova, North Korea, the People's Republic of China, Romania, Russia, Rwanda, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Vietnam, or such other countries as may be designated by the United States Government), (ii) export to Country Groups D:1 or E:2 (as defined herein) the direct product of the Program or the technology, if such foreign produced direct product is subject to national security controls as identified on the U.S. Commerce Control List, or (iii) if the direct product of the technology is a complete plant or any major component of a plant, export to Country Groups D:1 or E:2 the direct product of the plant or a major component thereof, if such foreign produced direct product is subject to national security controls as identified on the U.S. Commerce Control List or is subject to State Department controls under the U.S. Munitions List.

5. **UNITED STATES GOVERNMENT RESTRICTED RIGHTS.** The enclosed Product (i) was developed solely at private expense; (ii) contains "restricted computer software" submitted with restricted rights in accordance with section 52.227-19 (a) through (d) of the Commercial Computer Software-Restricted Rights Clause and its successors, and (iii) in all respects is proprietary data belonging to Cabletron and/or its suppliers. For Department of Defense units, the Product is considered commercial computer software in accordance with DFARS section 227.7202-3 and its successors, and use, duplication, or disclosure by the Government is subject to restrictions set forth herein.

6. **EXCLUSION OF WARRANTY.** Except as may be specifically provided by Cabletron in writing, Cabletron makes no warranty, expressed or implied, concerning the Program (including its documentation and media).

CABLETRON DISCLAIMS ALL WARRANTIES, OTHER THAN THOSE SUPPLIED TO YOU BY CABLETRON IN WRITING, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE PROGRAM, THE ACCOMPANYING WRITTEN MATERIALS, AND ANY ACCOMPANYING HARDWARE.

7. NO LIABILITY FOR CONSEQUENTIAL DAMAGES. IN NO EVENT SHALL CABLETRON OR ITS SUPPLIERS BE LIABLE FOR ANY DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS, PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR RELIANCE DAMAGES, OR OTHER LOSS) ARISING OUT OF THE USE OR INABILITY TO USE THIS CABLETRON PRODUCT, EVEN IF CABLETRON HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. BECAUSE SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, OR IN THE DURATION OR LIMITATION OF IMPLIED WARRANTIES IN SOME INSTANCES, THE ABOVE LIMITATION AND EXCLUSIONS MAY NOT APPLY TO YOU.

DECLARATION OF CONFORMITY

Application of Council Directive(s):	**89/336/EEC** **73/23/EEC**
Manufacturer's Name:	**Cabletron Systems, Inc.**
Manufacturer's Address:	**35 Industrial Way** **PO Box 5005** **Rochester, NH 03867**
European Representative Name:	**Mr. J. Solari**
European Representative Address:	**Cabletron Systems Limited** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG14 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EC Directive 73/23/EEC** **EN 55022** **EN 50082-1** **EN 60950**
Equipment Type/Environment:	**Networking Equipment, for use in a Commercial or Light Industrial Environment.**

We the undersigned, hereby declare, under our sole responsibility, that the equipment packaged with this notice conforms to the above directives.

Manufacturer	Legal Representative in Europe
Mr. Ronald Fotino	Mr. J. Solari
Full Name	Full Name
Compliance Engineering Manager	Managing Director - E.M.E.A.
Title	Title
Rochester, NH, USA	Newbury, Berkshire, England
Location	Location

TABLE OF CONTENTS

PREFACE

Purpose

This guide provides information about the features and applications of the Cabletron Systems SmartSTACK ELS100-S24TX2M stackable switch system.

Audience

This guide is intended for Ethernet Local Area Network (LAN) administrators and Management Information Systems (MIS) personnel with the following background:

- Working knowledge of Ethernet LANs

- Familiarity with Transmission Control Protocol/Internet Protocol (TCP/IP) and Simple Network Management Protocol (SNMP)

Conventions

This section describes the conventions used in this guide.

Message Formats

Two types of messages, identified by icons, appear in the text:

A note informs you of special circumstances.

A caution indicates the possibility of equipment damage.

Keyboard Entries

This guide uses the following conventions for keyboard entries:

- When you read "enter," type the text and press the [Enter] key.

- Example: Enter the Gateway IP address and press the [Enter] key.

- When you read "select," highlight the menu item and press the [Enter] key.

Other Conventions

This guide uses the following typographical conventions:

- Initial Caps   Menu titles and console menu selections.
- [Enter]   Used to designate the Enter or Return key.
- `courier font` Screen messages and user prompts.
- Selection   Describes a user-configurable user interface item.
- Field   Describes a read-only information item.

Organization

Chapter 1. Product Overview: Describes the features of the switch, front and rear panel components and application examples.

Chapter 2. Installation: Describes the content of your switch shipment, lists site requirements, and provides mounting instructions. Instructions for making connections and powering up the switch are provided as well.

Appendix A. Technical Specifications: Provides a list of standards compliance and certifications as well as physical and operational specifications.

Appendix B. Flow Control: Describes how the flow control features are used to provide a mechanism for protecting the switch from overload conditions and to keep additional traffic off the network.

Appendix C. Acronyms and Abbreviations: Provides definitions for a list of common acronyms and abbreviations used within the installation guide and the networking industry.

1. PRODUCT OVERVIEW

This chapter provides the following information:

- Product Description

- Features

- Front and Rear Panel Component Descriptions

- Feature Summaries

- Application Example

Description

This installation guide describes Cabletron Systems' SmartSTACK ELS100-S24TX2M Fast Ethernet switch. The switch provides 24 10Base-T/100Base-TX ports, plus two slots for optional slide-in 100Base-FX, 1000Base-SX or 1000Base-LX modules. One of these slots can also be used for an optional Stacking Module that allows you to attach up to four switches to a 4 Gbps high-speed backplane. There is also an optional SNMP-based Management Module that can be installed in the rear panel. This module supports both in-band and out-of-band access for managing the switch and the attached stack.

> **A switch stack, or a switch in a standalone configuration, must have an optional Management Module installed to enable all ports. The base unit alone has all ports disabled by default.**

The switch employs a high-speed switching fabric. This design allows for simultaneous transport of multiple packets at low latency on all ports. It also uses store-and-forward switching to ensure maximum data integrity. In this mode, the entire packet must be received into a port buffer and checked for validity before being forwarded. This prevents errors from being propagated throughout the network. This switch also features full-duplex capability on all ports, which effectively doubles the bandwidth of each connection.

The switch can be used in a standalone configuration, or can be stacked up to four high to form a single logical switch with up to 100 ports. When stacked, the 4 Gbps stack backplane provides enough bandwidth for the most demanding environment. Moreover, you can use a 100 Mbps fiber module for connecting to a remote site, or a Gigabit module for a high-speed backbone connection.

The RMON/SNMP/Web Management Module provides a broad range of management options. It includes a standards-compliant Simple Network Management Protocol (SNMP) agent. The SNMP agent allows network management station applications to collect and present status and performance information about the stack, as well as providing the ability

to configure and control functions in the stack. The module also supports Remote Monitoring (RMON) for Statistics, History, Alarm and Event groups (Groups 1-3, 9).

Network management can be performed in-band using TCP/IP or Telnet connection to the serial console port on the Management Module. This module also includes a built-in Web agent that provides management access via common http browsers such as Netscape Navigator and Microsoft's Internet Explorer. In addition, the console port allows out-of-band management using a PC, terminal, or modem connection.

The ELS100-S24TX2M switch is desktop or rack-mountable. LEDs on the front panel provide information about the operating status of the switch. The back panel contains the power connector, redundant power connector, and three slots for the optional modules. The side panel includes two fans that maintain ventilation and cooling for internal switch components.

Features

- Ports:
    - 24 dual-speed 10Base-T/100Base-TX ports using RJ-45 connectors (MDI-X)
    - 3 slots for optional modules
    - 1 redundant power unit socket
- Optional Media Modules:
    - EPIM1000-S1SX: 1000Base-SX Module provides 1 SC multi-mode fiber optic port for an uplink connection to the stack
    - EPIM1000-S1LX: 1000Base-LX Module provides 1 SC single-mode fiber optic port for an uplink connection to the stack
    - EPIM100-S2MFX: 100Base-FX Module provides 2 SC multi-mode fiber optic ports for an uplink connection to the stack
    - EPIM100-S1SFX: 100Base-FX Module provides 1 SC single-mode fiber optic port for an uplink connection to the stack
- Optional Stacking Module:
    - ELS100-STACK: Stacking Module provides 2 SCSI II connectors for stacking switches (includes one 32 cm stack interconnection cable)
- Optional Stacking Cable:
    - 9380142: 32 cm short stack interconnection cable
    - 9380143: 1 m long stack interconnection cable
- Optional RMON/SNMP/Web Management Module:
    - ELS100-SMGMT: Management Module provides SNMP, RMON, and Web management support for the stack.

- Switch Architecture:
  - 3 controllers with 8 10/100 ports
  - IEEE 802.3u auto-negotiation of half/full-duplex operation on all RJ-45 ports
  - Up to 4 switch units can be stacked together, supporting up to 100 connections
  - 128 KB packet buffering for 10/100 ports, 2 MB packet buffering for 1000 ports
  - Store-and-forward switching
  - 8K address forwarding table
  - Forwarding: 14,880 packets-per-second (64 byte packets) @10 Mbps; 148,800 pps @100 Mbps; 1,488,000 pps @1000 Mbps
  - Filtering: 14,880 packets-per-second (64 byte packets) @10 Mbps; 148,800 pps @100 Mbps; 1,488,000 pps @1000 Mbps
- Network Management:
  - SNMP compliant agent: MIB II (RFC 1213); Bridge MIB (RFC 1493); Ethernet-like MIB (RFC 1643); RMON - Statistics, History, Alarm and Event groups (RFC 1757); Interface Evolution MIB (RFC 1573); Q-MIB (IEEE 802.1Q); private MIB extensions
  - Access via in-band, Internet browser, or Telnet
  - Console port (RS-232, male DB-9 connector, null modem) supports access via direct or modem connection
  - BootP for IP address configuration
- Reliability:
  - Redundant power supply support
- Software:
  - Diagnostics for product testing and troubleshooting
  - Firmware upgrades using the console port or in-band with TFTP
- LED Indicators:
  - System: Power, RPU, Management
  - 10Base-T/100Base-TX ports: link/speed/disable, mode (flow control, full duplex, activity)
  - Media module ports: Status, Activity

Front Panel

Figure 1-1 shows the front panel of the Cabletron Systems SmartSTACK ELS100-S24TX2M. Table 1-1 defines the ELS100-S24TX2M front panel components.
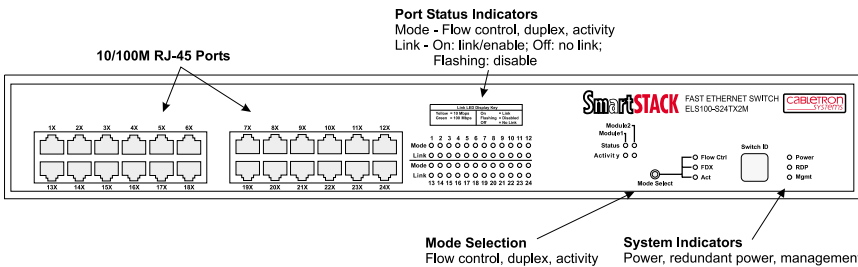

Figure 1-1. ELS100-S24TX2M Front Panel

Table 1-1. Front Panel Components

Name	Function
Power LED	Lights steady green to indicate power is supplied to the switch. Off indicates no power is supplied to the switch.
RDP LED	Lights steady to indicate that a redundant power unit is attached and is in backup or active mode.
Mgmt LED	Lights steady to indicate that a Management Module is installed and in operational mode.
Link LEDs	Yellow indicates a 10 Mbps link; green indicates a 100 Mbps link, off indicates no link; and flashing indicates that the port has been manually disabled.
Mode LEDs	The Mode Select button selects the LED display mode. Act: Flashing indicates activity on the port segment. FDX: Lights steady to indicate full-duplex operation. Flow Ctrl: Lights steady to indicate that flow control is enabled for the port.
Module LEDs	Status: Indicates a module is installed in the slot. Activity: Flashing indicates activity on the module.
Switch ID LCD	LCD displays the stack ID number of the switch.
10Base-T/100Base-TX RJ-45 ports	Copper ports using RJ-45 port connectors. All the ports are wired MDI-X.

Optional Modules

Figure 1-2 shows the optional modules available for the Cabletron Systems SmartSTACK ELS100-S24TX2M. Table 1-2 defines the optional module components.
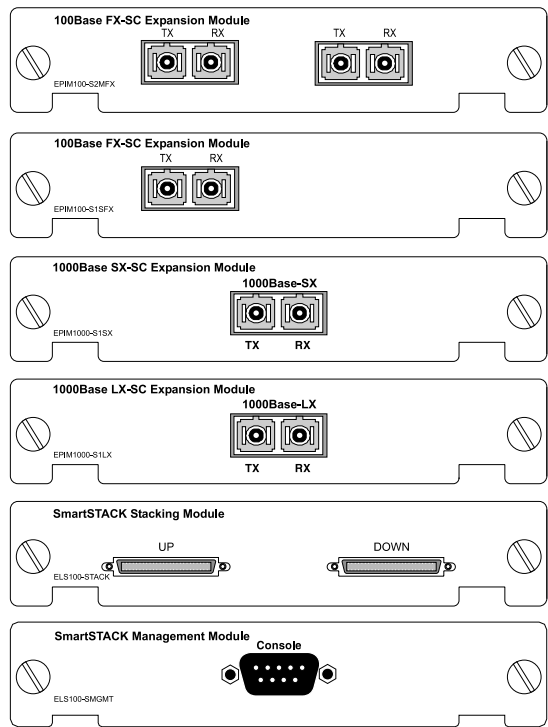

Figure 1-2. Optional Modules

Table 1-2. Optional Module Components

Module	Components
100Base-FX (MMF)	Ports: Two multi-mode fiber ports using SC connectors for uplink. (See 100Base-FX/1000Base-SX/LX Fiber Ports on page 28 for a detailed description.)
100Base-FX (SMF)	Ports: One single-mode fiber port using SC connectors for uplink. (See 100Base-FX/1000Base-SX/LX Fiber Ports on page 28 for a detailed description.)
1000Base-SX	Ports: One fiber port using SC connectors for uplink. (See 100Base-FX/1000Base-SX/LX Fiber Ports on page 28 for a detailed description of these ports.)

Module	Components
1000Base-LX	Ports: One fiber port using SC connectors for uplink. (See 100Base-FX/1000Base-SX/LX Fiber Ports on page 28 for a detailed description of these ports.)
Stacking	Ports: Two SCSI II ports for stack uplink and downlink connections.
	One 32 cm cable included with the stacking module and both the 32 cm cable and the 1 m cable can be ordered separately, if required.
Management	Console port: Male DB-9 connector configured as a null modem connection for serial out-of-band management using the console menus.

Rear Panel

Figure 1-3 shows the ELS100-S24TX2M rear panel and Table 1-3 defines the rear panel components.
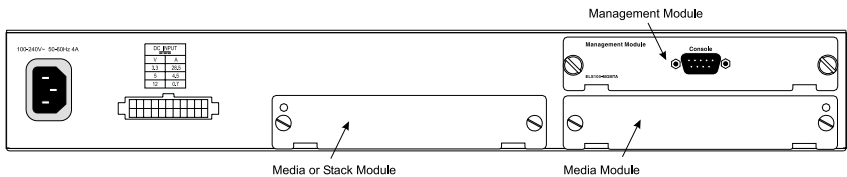
Figure 1-3. ELS100-S24TX2M Rear Panel

Table 1-3. Rear Panel Components

Name	Function
Power Connector	Provides AC power to the switch.
Redundant Power Connector	This connector is provided for the option of adding an additional DC redundant power unit (RPU) which can supply power to the switch if its primary power supply fails. (Refer to the manual provided with the RPU for further details.)
Slots for Optional Modules	The upper slot is for the Management Module only. The two lower slots support optional media modules or the Stacking Module.

Feature Summaries

The following summaries describe ELS100-S24TX2M features in areas such as standards compliance, functionality, performance, and options.

IEEE 802.1D Bridge

The ELS100-S24TX2M switch is fully compliant with IEEE 802.1D transparent bridging specifications. An address table is provided for learning, filtering, and forwarding. The switch can support up to a maximum of 8K addresses. Addresses are automatically learned by the switch, and can be individually assigned specific forwarding treatment by the network administrator if desired. Forwarding table configuration can be made out-of-band via the console interface or in-band via SNMP or Telnet. Static and dynamic addresses are both stored in this table. One static address is assigned per port by default. The Static Unicast Address Table Configuration screen in the console menus allows you to assign additional static addresses if required.

Spanning Tree Protocol

The ELS100-S24TX2M switch supports the IEEE 802.1D Spanning Tree Protocol. This protocol allows redundant connections to be created between different LAN segments for purposes of fault tolerance. Two or more physical paths between different segments can be created through the switch, with the Spanning Tree Protocol choosing a single path at any given time and disabling all others. If the chosen path fails for any reason, a disabled alternative is activated, thereby maintaining the connection. This prevents network traffic from circulating in an endless loop formed by multiple connections to the same LAN segment.

Spanning Tree parameters are configurable using the Spanning Tree Configuration Menu of the console menus, the on-board Web agent, or via SNMP (see Appendix B, "Spanning Tree Concepts," in the Management Guide for more information).

Frame Buffering and Frame Latency

The ELS100-S24TX2M switch is a store-and-forward switching device. Each frame is copied into switch memory before being forwarded to another port. This method ensures that all forwarded frames conform to a standard Ethernet frame size and have a correct cyclic redundancy check (CRC) for data integrity. This switching method prevents bad frames from traversing the network and using up valuable network bandwidth, as with cut-through switching technology.

To minimize the possibility of dropping frames on congested ports, the ELS100-S24TX2M switch provides 128 KB of frame buffering per port. This buffer space is used to queue packets for transmission on congested networks. This is an additional advantage over cut-through switching technology, which drops packets immediately when experiencing collisions.

Software Download

The ELS100-S24TX2M switch supports the industry-standard Trivial File Transfer Protocol (TFTP) for downloading software to the switch. All switch software is stored in a 2 MB sectored flash ROM. The download feature allows you to easily install software upgrades to the unit. Software can alternatively be downloaded via the serial console port using the XMODEM protocol.

A TFTP software download is invoked via the Management Setup Menu using the console menus. A TFTP download can also be invoked using the on-board Web agent or via SNMP.

Non-Volatile Parameter Storage

Important operating parameters such as IP addresses, Spanning Tree configuration, and management security parameters, are stored in non-volatile flash memory. These values are retained when the switch experiences power interruptions or is powered down for normal maintenance.

Configuration and Management Interfaces

The ELS100-S24TX2M switch, or attached stack, can be managed using any of the following methods:

- Serial console, out-of-band

  An RS-232 connection, using a DB-9 connector, is included on the Management Module for system management. Serial console management can be performed out-of-band using a terminal or computer running communications software. You can connect directly to the RS-232 port on the Management Module, or make a connection via a modem. See the Management Guide for information on managing the ELS100-S24TX2M switch (or stack) via the serial console.

- Telnet, in-band (over Ethernet)

  The switch supports management through a Telnet connection using the TCP/IP protocols. Telnet is performed using a terminal or computer running communications software. See the Management Guide for information on managing the system via Telnet. Global user name and password protection for changing the operating parameters of the switch is provided.

- Web-based network manager, in-band

  The system can be managed over HTTP protocol with a Web browser (Internet Explorer 4.0 or above, or Netscape Navigator 4.0 or above). Standard agent MIBs embedded in the switch provide basic SNMP management through an embedded graphic interface.

- SNMP-based network manager, in-band

  The system can also be managed using SNMP, the most common protocol used today for network management. Standard agent MIBs embedded in the switch provide basic SNMP management through industry-standard SNMP applications.

  Management security protection is provided based on SNMP community names. See Chapter 4, "SNMP Management," in the Management Guide for more information.

RMON

RMON (Remote Monitoring) is a facility used to manage networks remotely while providing multi-vendor interoperability between monitoring devices and management stations. RMON is defined by an SNMP MIB. This MIB is divided into nine different groups, each gathering specific statistical information or performing a specific function. RMON-capable devices gather network traffic data and then store them locally until downloaded to an SNMP management station.

The ELS100-S24TX2M supports four of the nine groups of RMON defined for Ethernet networks on a per segment basis. Specifically, these are:

- Statistics: a function that maintains counts of network traffic statistics such as number of packets, broadcasts, collisions, errors, and distribution of packet sizes.

- History: a function that collects historical statistics based on user-defined sampling intervals. The statistical information collected is the same as the Statistics group, except on a time stamped basis.

- Alarm: a function that allows managers to set alarm thresholds based on traffic statistics. Alarms trigger other actions through the Event group.

- Event: a function that operates with the Alarm group to define an action that will be taken when an alarm condition occurs. The event may write a log entry and/or send a trap message.

Note that RMON statistics and other information can only be viewed using a connection to the on-board Web agent or via other compatible SNMP management applications.

Port Mirroring

The ELS100-S24TX2M switch includes the ability to mirror the traffic being switched on any port for purposes of network traffic analysis and connection integrity. When this feature is enabled, a protocol analyzer or RMON probe can be connected to the mirror port. You can only mirror one port to another port at one time. Port mirroring occurs at the same speed configured for the port (10Mbps-to-10Mbps or 100Mbps-to-100Mbps). Port mirroring is configurable using the console interface menus, the on-board Web agent, or via SNMP.

Auto-negotiation

Auto-negotiation is a process that permits the switch to automatically select the operational modes of its 10/100 RJ-45 ports. Upon first being connected, the switch detects the speed of the network the port is connected to, either 10Mbps or 100Mbps, and the type of communication setting, half or full duplex. The port is then automatically set by the switch to operate in the proper mode, without user intervention. It is not required that the network device being connected to the switch supports auto-negotiation as the ELS100-S24TX2M switch automatically adjusts to the network device's communication settings. Auto-negotiation is configurable using the console interface menus, the on-board Web agent, or via SNMP.

BootP

The Bootstrap Protocol (BootP) provides for the capability of passing configuration information to hosts on a TCP/IP network. Using this process, network devices do not need to be configured before they can communicate using the TCP/IP protocol suite. The ELS100-S24TX2M switch uses BootP to automatically configure IP address information without requiring access to the console menus. BootP operation is configurable using the console interface menus, the on-board Web agent, or via SNMP.

LEDs

The switch port LEDs provide a quick and accurate display of the integrity of switch connections and port mode. Each RJ-45 port has a Link and Mode LED. The color of the Link LED indicates a 10 Mbps or 100 Mbps connection. The operation of the Mode LEDs can be changed by use of the LED Mode button on the switch front panel. When the LED Mode button is pressed, the operation of the RJ-45 Mode LEDs changes to indicate Activity (Act) and full/half duplex operation (FDX), and flow control (Flow Ctrl) respectively. The module LEDs indicate Status and Activity for each of the modules. The module LEDs are not affected by the LED Mode button.

Full Duplex Mode

The full-duplex mode of operation on a port can double the throughput of switch connections. This mode disables the collision detection portion of the Ethernet Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol, allowing for two-way traffic. Full duplex is configurable using the console interface menus, the on-board Web agent, or via SNMP.

Flow Control

Flow control allows you to manage network traffic during congestion periods and to prevent the loss of packets when port buffer thresholds are exceeded. Flow control also serves to deny access to additional traffic that could add to a congestion condition. The ELS100-S24TX2M switch supports flow control per the IEEE 802.3x standard. Note that flow control is disabled on all ports by default but can be enabled on a per-port basis by using the console interface menus, the on-board Web agent, or via SNMP. See Appendix B, "Flow Control," for more information on this feature.

> **If flow control is desired for one port, it is recommended that it be enabled on all ports. However, note that flow control should not be used if a port is connected to a hub. Also, be aware that when interconnecting high-speed LANs (such as Gigabit Ethernet) and low-speed LANs, flow control can cause traffic from the high-speed LAN to be blocked for all other ports on the switch.**

Virtual LANs (VLANs)

VLANs allow you to connect users to a specific LAN segment regardless of their physical location. The ELS100-S24TX2M switch supports tagged VLANs per the IEEE 802.1Q draft standard. With frame tagging, a short tag is appended to every frame that crosses the network backbone. The tag identifies which VLAN the frame belongs to. See Appendix B, "Virtual LANs," in the Management Guide for more information.

Class of Service

Class of Service support allows you to assign a higher priority to selected traffic passing through the switch. The ELS100-S24TX2M switch supports Class of Service attributes per the IEEE 802.1p standard using a priority queuing mechanism. This feature ensures that traffic during congestion periods will not interfere with traffic assigned a higher priority. Traffic assigned a lower priority is subject to discard when memory is in short supply. See Appendix C, "Class of Service," in the Management Guide for more information.

Port Trunking

Port trunking allows you to combine ports into an aggregate connection between ELS100-S24TX2M switches. Besides balancing the load across each port in the trunk, the additional ports provide redundancy by taking over the load if a port in the trunk should fail. The ELS100-S24TX2M allows up to four RJ-45 ports from a pre-determined selection of ports to be joined together as a trunk. Up to three port trunks on a single ELS100-S24TX2M switch, or 12 for an entire stack, can be configured. Note that ports cannot be configured into a trunk across switches in a stack.

Factory Defaults

Table 1-4 lists the default settings for switch configuration parameters with the Management Module installed. Each parameter can be changed via the console menus or Telnet.

Table 1-4. Factory Default Settings

Parameter	Default Value
Multicast Filtering	
GMRP	Disabled
IGMP Multicast Filtering	Disabled
Port Configuration	
Flow Control	Disabled
Speed and Duplex	Auto
Admin	Enabled
Port Priority	
Default Ingress User Priority	0
Spanning Tree Algorithm	
Active Aging Time	300
Bridge Priority	32768
Forward Delay	15
Hello Time	2
Max Age	20
Path Cost	4 - 1000Mbps ports 19 - 100Mbps ports 100 - 10Mbps ports
Port Priority	128
Spanning Tree Protocol	Enabled
System Configuration	
BootP Enable	Disabled
Password	<none>
Screen Timeout	10 min
Send Authentication Fail Traps	Enabled
SNMP Community Name	public, private
Terminal Baud Rate	Auto
User Names	admin, guest

Parameter	Default Value
Virtual LANs	
Acceptable VLAN Frame Type	All
Configurable PVID Tagging	Yes
GVRP	Disabled
Untagged VLAN Group Assignment	1
VLAN Ingress Filtering	False
VLAN Learning	SVL

Application Examples

The exploding popularity of the Internet and of corporate intranets, as well as new, high-bandwidth desktop applications, are driving the demand for Fast Ethernet. The increase in multimedia traffic and the need to support legacy protocols alongside new, data intensive applications is driving the need for network segmentation and traffic prioritization.

The ELS100-S24TX2M switch is ideal for meeting the needs of today's high performance networks. The switch's low cost and high port count makes it attractive and affordable for dedicated 10/100Mbps connections to the desktop. In addition, extensive features, including redundant links, traffic Class of Service and VLAN capability, provide the management needed for the workgroup and local backbone.

The following sections illustrate the ELS100-S24TX2M switch employed in application examples:

- Client/Server Network
- Local Backbone

Client/Server Network Application

To improve workstation performance in a client/server environment, the ELS100-S24TX2M switch can be configured to provide 200 Mbps full duplex Fast Ethernet connections to servers by connecting each to a dedicated switch port (Figure 1-4). Users can be accommodated through connections to hubs, both at 10Mbps and 100Mbps speeds, through 10Mbps switches with 100Mbps uplinks, or through direct connections. The fiber uplinks are available to connect the switch to a remote location, such as another building floor or a separate building.
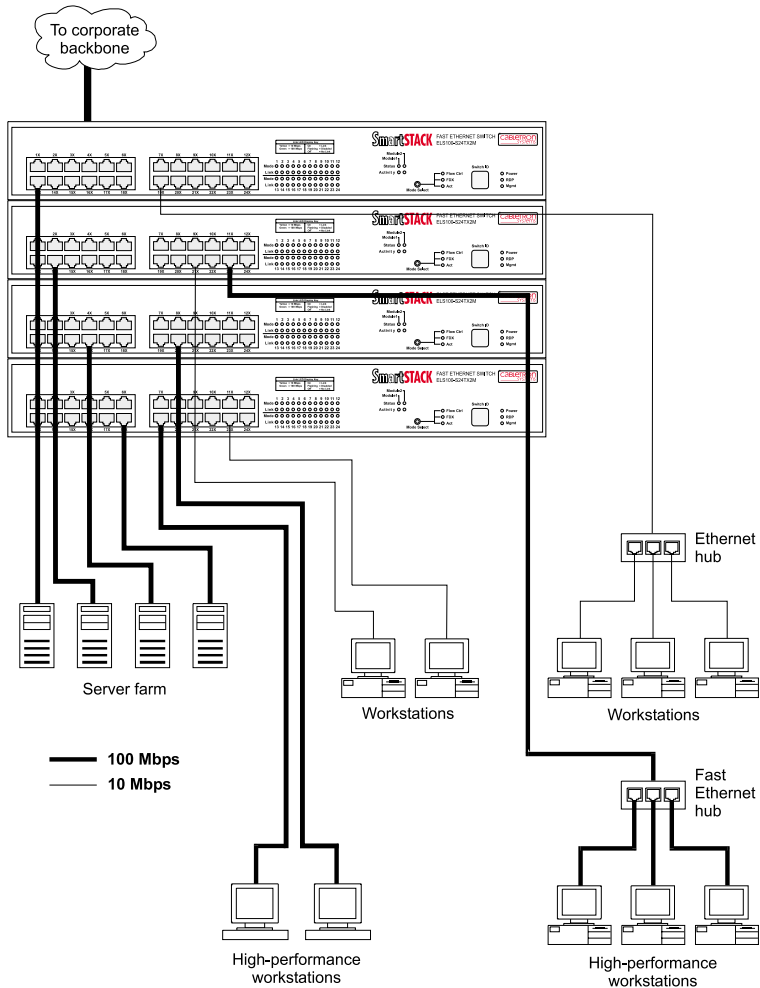
Figure 1-4. Client/Server Network Application

Local Backbone Application

The ELS100-S24TX2M switch can be used in a local backbone application, connecting network segments together and providing file-server access (Figure 1-5). Workgroup hubs are provided with a single connection to the switch while servers are put on dedicated 100 Mbps ports. Routers and other networking devices can connect off of the switched backbone as well. The fiber uplinks are available to connect the switch to a remote location, such as another building floor or a separate building.
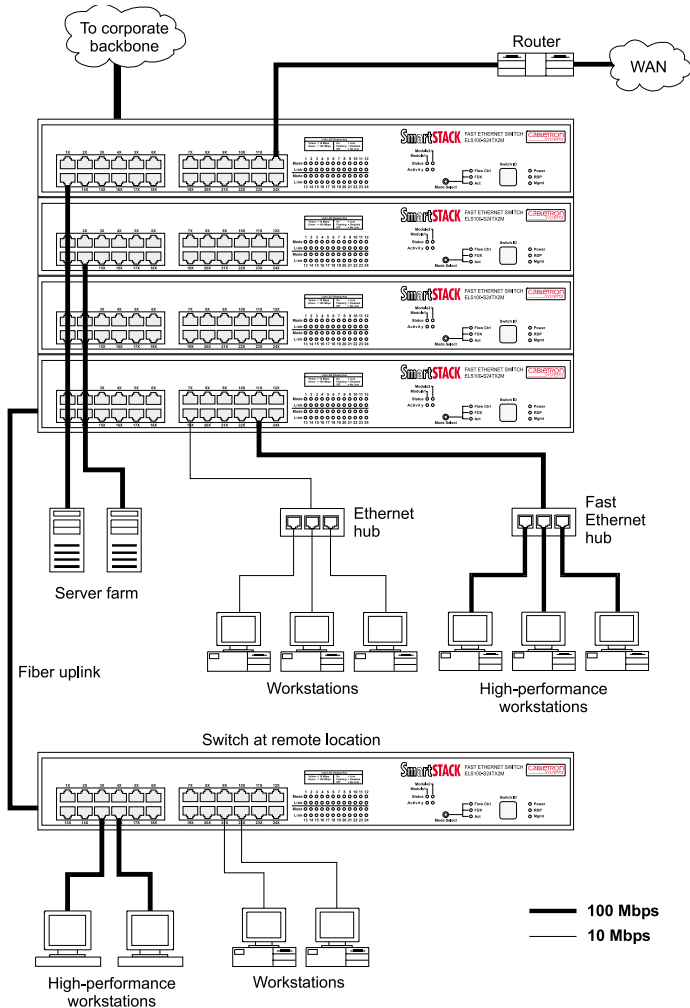
Figure 1-5. Local Backbone Application

2. INSTALLATION

Inspecting Your Shipment

When you receive the shipment of your switch, check the package contents and make sure you have the following items:

- ELS100-S24TX2M stackable switch

- Mounting ears and mounting screws

- Four rubber feet

- ESD wrist strap

- Power cord

- Product documentation

> **One 32 cm stack interconnection cable is included with every optional Stacking Module. Both the 32 cm and 1 m cable can also be ordered separately.**

Site Requirements

Before you install the switch, make sure the site meets the following requirements:

- Mounting

    Provide a flat table, shelf surface, or an optional 19 in. (48.3 cm) equipment rack.

    Use an EIA standard equipment rack that is grounded and physically secure.

- Power source

    Provide a power source within six feet (1.8 m) of the installation location. This source must provide 100 VAC to 240 VAC, and 50 Hz to 60 Hz power, with a 50 VA minimum. Power specifications for the switch are shown in Appendix A, "Technical Specifications.

> **Primary voltage selection within the above ranges is automatic and requires no user action.**

- Environmental

  Install the ELS100-S24TX2M switch in a dry area, with adequate air circulation. Avoid placing the switch in direct sunlight or near other heat sources, such as hot-air vents. For temperature and humidity specifications, see Appendix A, "Technical Specifications."

- Ventilation

  Do not restrict airflow by covering or obstructing air inlets on the side of the switch.

Mounting the Switch or Stack on a Table or Shelf

You can mount a standalone switch (or a stack of up to four switches) on a table or shelf. Locate the switch (stack) in a position that allows access to the front panel RJ-45 ports, visibility of the port LEDs, and access to the rear-panel modules and power cord. Make sure that the mounting surface can safely support the switch (stack) and that there is adequate space around the switch (stack) for ventilation and cooling.

1. The switch ships with four (4) rubber feet. Stick the self-adhesive rubber foot pads on each of the four concave spaces located on the bottom of the switch. The rubber foot pads cushion the switch against shock/vibrations and provide space between each switch for ventilation.

2. If you want to stack switches, repeat step 1 for each switch to be stacked. Place the first switch on a firm flat surface where you want to install the stack. Stack the other switches on top of this unit.

3. Refer to "Connecting Switches to the Stack's Backplane" on page 20.

Mounting the Switch in a Rack

The switch ships with two (2) multi-position mounting ears and four (4) mounting screws.

The mounting screws are used to attach the mounting ears to the switch. Once the ears are attached to the switch, you will need to provide appropriate screws to mount the switch in a rack.

Figure 2-1 shows the orientation of the mounting ears for attaching the ears to the switch for a rack mount application. Mount the switch with the front panel facing forward. Do the following:

1. Mount one of the ears to the switch using two (2) of the supplied screws. Repeat this step for the other side of the switch.

2. Slide the switch into the rack and align the holes in the rack mounting ears with the holes in the rack rails.

3. Insert and tighten appropriate rack-mounting screws (not provided).

4. Refer to "Connecting Switches to the Stack's Backplane" on page 20.
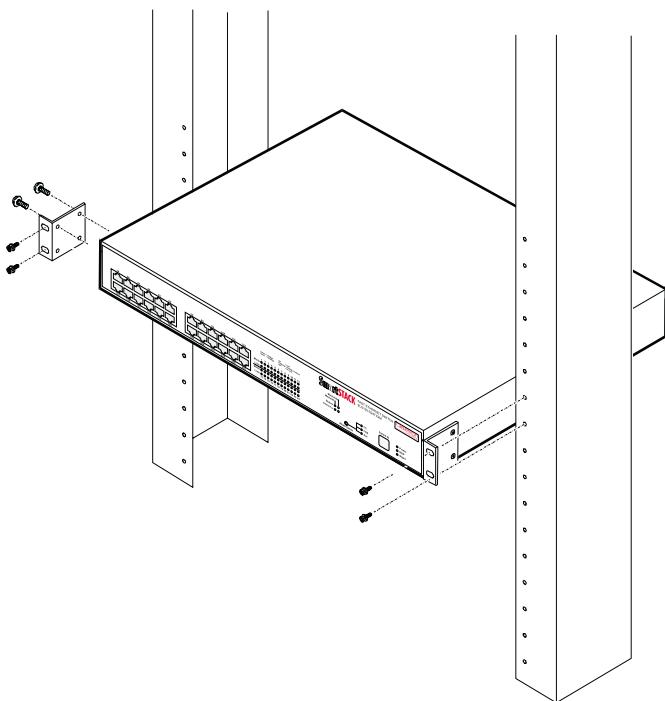
Figure 2-1. Mounting the Switch in a Rack

Connecting Switches to the Stack's Backplane

The optional Stacking Module ships with one 32 cm stacking cable. Both the 32 cm and 1 m stacking cable can also be ordered separately.

Figure 2-2 shows how the stack cables are cascaded between switches in a stack (rack). To connect up to four switches to the backplane, plug one end of the stack cable in the "DOWN" port of the top switch and the other end to the "UP" port of the next switch. Repeat this step for each switch in the stack (or rack). Form a simple chain starting at the DOWN port on the first switch and ending at the UP port on the last switch.
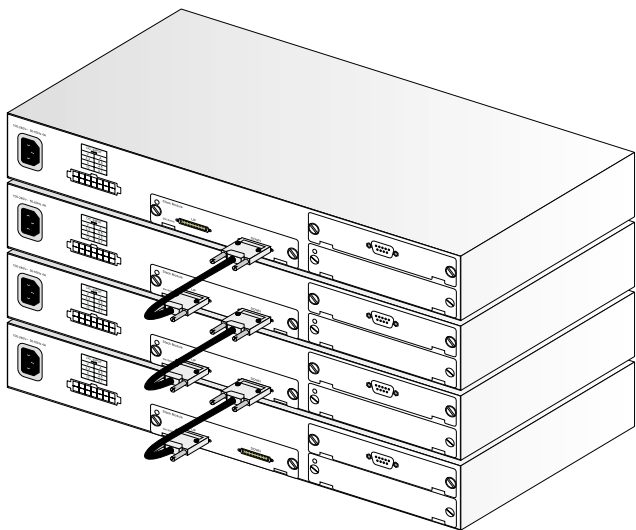
Figure 2-2. Connecting Switches to the Stack's Backplane

Stacking Module and Interconnect Cables

Table 2-1 provides information for the Stacking Module and interconnect cables available for the ELS100-S24TX2M.

Table 2-1. Stacking Module and Interconnect Cables

Part Number	Functions	Description
ELS100-STACK	Stack inter-connection	Stacking Module used to connect switches in a stack.
		Unit ships with one 32 cm stack interconnect cable (9380142).
9380142	Stack inter-connection	32 cm short stack interconnect cable.
9380143	Stack inter-connection	1 m long stack interconnect cable.

Installing an Optional Module into the Switch

Optional modules are available for media expansion, stacking and management. These modules can be installed into the modular slots on the rear panel of the switch. The Management Module must be installed in the upper slot, and the Stacking Module in the lower-left slot. The media extension modules can be installed in either of the two lower slots.

DO NOT install slide-in modules with the switch powered on. Be sure you power off the switch before installing any module.

To install an optional module into the switch, do the following:

1. Disconnect power to the switch.

2. Remove the blank metal plate (or a previously installed module) from the appropriate slot by removing the two screws with a flat-head screwdriver. A media module can be installed in either of the two lower slots on the rear panel of the switch. A Management Module can be installed in the upper slot on the rear of the switch.

3. Before opening the package that contains the module, touch the bag to the switch casing to discharge any potential static electricity. Also, use the ESD wrist strap included with the package.

4. Remove the module from the anti-static shielded bag.

5. Holding the module level, guide it into the carrier rails on each side and gently push it all the way into the slot, ensuring that it firmly engages with the connector.
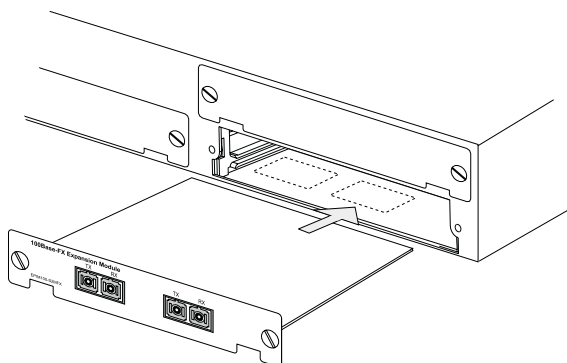
Figure 2-3. Installing an Optional Module into the Switch

6. If you are sure the module is properly mated with the connector, tighten the retainer screws by hand to secure the module in the slot.

7. Connect power to the switch.

Connecting a Terminal to the Console Port

The console port is a serial RS-232 interface port that enables a connection to a terminal for performing switch monitoring and configuration functions. The terminal may be a PC or workstation running terminal emulation software, or a terminal configured as a Data Terminal Equipment (DTE) connection. Alternatively, this port can be connected to an external modem to enable remote dial-in management. You can use the out-of-band management program (described in the next chapter) over a standard modem connection.

If you connect a terminal to the console port prior to powering on the switch, you can observe the progress and results of the power-on self test as the switch goes through its initialization process. See "Powering the Switch" on page 25.

The console port connector is configured as a male null-modem connection using a male DB-9 (see Table A-1 for pinouts). A standard straight-through wired RS-232 cable is supplied with the Management Module for connecting to this interface. This cable is shielded to comply with emissions regulations and requirements.

Console Port (Out-of-Band) Connections

To connect the ELS100-S24TX2M console port to a terminal, do the following:

1. Connect a VT100 compatible terminal or a PC running a terminal emulation program to the console port (Figure 2-4). Use the null-modem cable provided with the Management Module, or use a null-modem connection that complies with the wiring assignments shown in Appendix A.
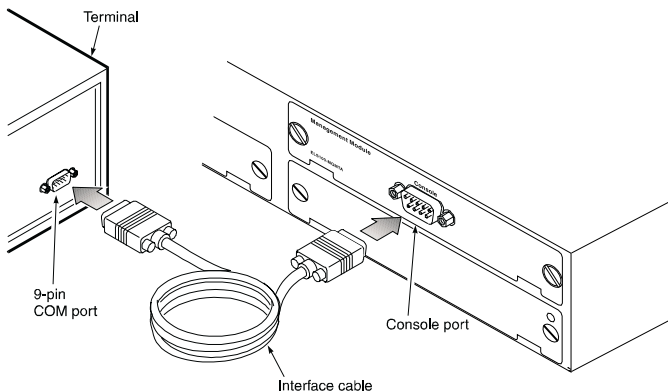
Figure 2-4. Connecting a Terminal to the Console Port

2. Connect one end of the interface cable directly to the Management Module's console port and tighten the retaining screws.

3. Connect the other end of the interface cable to a terminal (in some instances, an adapter may be required to make this connection).

4. From your terminal, start the terminal emulation program.

5. Configure the terminal to the following communication settings: VT100 emulation, 19200 baud, no parity, 8 data bits, 1 stop bit, no flow control, ASCII character set.

Remote Management via the Console Port

Configure the Switch Site - Connect the Management Module's DB-9 serial port to the modem's serial port using standard cabling. For most modems using a 25-pin port, you will have to provide an RS-232 cable with a 9-pin connector on one end and a 25-pin connection on the other end. You do not have to set the modem at the switch's site, because the switch will automatically configure it to auto-answer mode.

Configure the Remote Site - At the remote site, connect the PC's COM port (COM 1-4) to the modem's serial port. Set terminal emulation type to VT100, specify the port used by your PC (i.e., COM 1-4), then set communications to 8 data bits, 1 stop bit, no parity, 19200 bps, and no flow control.

In-Band Connections

Prior to accessing the Management Module via a network connection, you must configure it with a valid IP address, subnet mask, and default gateway using an out-of-band connection or the BootP protocol.

> **The Management Module must first be configured to issue BootP requests, since the default is BootP disabled. Refer to the Management Guide for more information.**

Telnet Connection - Prior to accessing the Management Module via an in-band Telnet connection, you must configure it with a valid IP address, subnet mask, and default gateway using an out-of-band connection or the BootP protocol. After configuring the switch's IP parameters, you can access the on-board configuration program from anywhere within the attached network.

In-Band Network Connection - The on-board configuration program can be accessed using Telnet from any computer attached to the network. The switch and stack can also be managed by any computer using a Web browser (Internet Explorer 4.0 or above, or Netscape Navigator 4.0 or above), or from a network computer using third-party network management software.

Management Module

Table 2-2 provides information for the Management Module available for the ELS100-S24TX2M.

Table 2-2. Management Module

Part Number	Functions	Description
ELS100-SMGMT	RMON/SNMP/ Web Management	SNMP agent module used to manage the switch (or attached stack). Includes RS-232 serial port for console connection.

Powering the Switch

To supply power to the switch, connect the power cord to the switch and to a grounded three-prong wall outlet (Figure 2-5). See Appendix A, "Technical Specifications" on page 29 for more information regarding specific international power cord requirements.
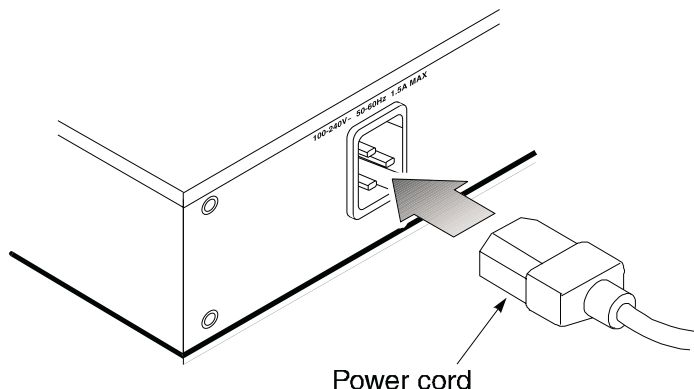
Figure 2-5. Connecting the Power Cord

The Power LED lights green (see Figure 1-1). If it does not, check to make sure that the power cable is plugged in correctly and that the power source is good.

When power is applied, the switch conducts a series of hardware and software tests to verify operation. If a terminal or computer is connected to the console port, the results of the tests are displayed on the screen. If you want to display the results of the tests after the switch has been turned on, turn the power to the switch off then back on.

The switch performs two basic types of tests at power-up. During this time, all the LEDs light in sequence. These tests are:

- Serial port

    The serial console port test is the first test. If the switch fails, no further tests are performed and the console displays no information.

- Memory

    Memory tests on the CPU RAM are performed after the serial port test. No results are displayed on the console.

After these tests are performed, the system initialization screen provides the option of starting the operational software of the switch or performing an XMODEM download to upgrade system firmware. When the operational software is started, the system is functional and the user interface is ready to receive commands at the console.

Network Cable Requirements

Copper

Table 2-3 specifies the cable types and length constraints for the various copper interfaces on the ELS100-S24TX2M.

Table 2-3. Copper Cable Specifications

Interface Type	Cable Requirement	Maximum Length
10Base-T	Category 3 or 5 Unshielded Twisted Pair (UTP)	100m (328 ft.)
100Base-TX	Category 5 UTP	100m (328 ft.)

Fiber

Table 2-4 specifies the fiber types, bandwidth requirements, and length constraints for the Fast Ethernet fiber interface on the fiber optic media modules.

Table 2-4. Fast Ethernet Fiber Specifications

Interface Type	Fiber Type	Fiber Diameter (microns)	Maximum Length (m)
100Base-FX (SC connectors)	multi-mode	62.5	2,000m (6,560 ft.)
100Base-FX (SC connectors)	single-mode	10	10 km (6.21 miles)

Table 2-5 specifies the fiber types, bandwidth requirements, and length constraints for the Gigabit Ethernet short-wavelength fiber interface on the fiber optic media module.

Table 2-5. 1000Base-SX Fiber Specifications

Fiber Diameter (microns)	Modal Bandwidth @ 850 nm	Range
62.5 µm MMF	160 MHz/km	2-220 Meters
62.5 µm MMF	200 MHz/km	2-275 Meters
50 µm MMF	400 MHz/km	2-500 Meters
50 µm MMF	500 MHz/km	2-550 Meters

Table 2-6 specifies the fiber types, bandwidth requirements, and length constraints for the Gigabit Ethernet long-wavelength fiber interface on the fiber optic media module.

Table 2-6. 1000Base-LX Fiber Specifications

Fiber Diameter (microns)	Modal Bandwidth @ 1300 nm	Range
62.5 µm MMF	500 MHz/km	2-550 Meters
50 µm MMF	500 MHz/km	2-550 Meters
50 µm MMF	400 MHz/km	2-550 Meters
10 µm SMF	N/A	2-5000 Meters

10Base-T/100Base-TX Ports

The 10Base-T/100Base-TX ports use RJ-45 connectors. Figure 2-6 shows an RJ-45 connector being inserted into a port.
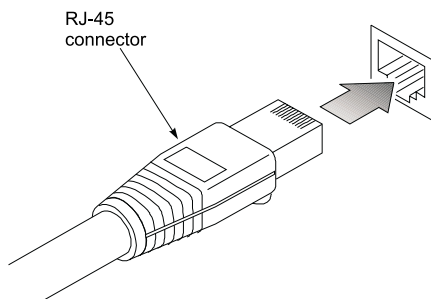
RJ-45
connector

Figure 2-6. Inserting an RJ-45 Connector into a Port

The ports on the base unit are wired with the MDI-X function implemented. These ports interface to UTP cabling for connection to 10Base-T or 100Base-TX network segments or end-stations. These UTP connections meet the requirements of ISO 8877, specified by 10Base-T, Section 14 of the IEEE 802.3 specification. Workstations or servers can be connected to these ports using standard straight-through wired cables.

For connections to other switches or hubs, use an MDI port on the other device. If an MDI port is not available, a crossover cable may be necessary (refer to "MDI/MDI-X Crossover Cable Wiring" in Appendix A). See Table A-2, "10Base-T/100Base-TX Pinouts," for 10Base-T/ 100Base-TX connector pin assignments.

100Base-FX/1000Base-SX/LX Fiber Ports

The 100Base-FX and 1000Base-SX/LX fiber ports use SC connectors.
Figure 2-7 shows an SC fiber connector being inserted into a fiber port on
the ELS100-S24TX2M.
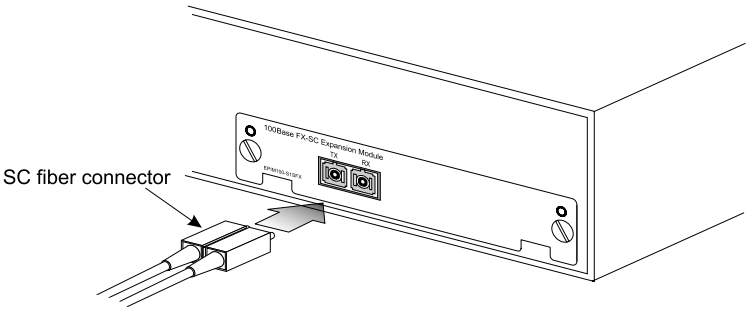
Figure 2-7. Inserting an SC Fiber Connector into a Fiber Port

The fiber uplink modules employed (Table 2-7) support multi-mode 62.5/
125µm fiber and single-mode 10/125µm fiber. The 100Base-FX and
1000Base-SX/LX ports use SC fiber connectors. The fiber connectors are
configured as a receive (RX) / transmit (TX) pair.

Table 2-7. Fiber Uplink Modules

Part Number	Functions	Description
EPIM100-S2MFX	100Base-FX-MM	Dual-port multi-mode (MM) fiber uplink module using SC fiber connectors.
EPIM100-S1SFX	100Base-FX-SM	Single-port single-mode (SM) fiber uplink module using SC fiber connectors.
EPIM1000-S1SX	1000Base-SX-MM	Single-port multi-mode (MM) fiber uplink module using SC fiber connectors.
EPIM1000-S1LX	1000Base-LX-SM	Single-port single-mode (SM) fiber uplink module using SC fiber connectors.

APPENDIX A. TECHNICAL SPECIFICATIONS

General

Standards Compliance

IEEE 802.1D Transparent Bridging Specifications (ISO/IEC 10038)

IEEE 802.1p Traffic Class Expediting and Dynamic Multicast Filtering

IEEE 802.1Q Virtual Bridged Local Area Networks

IEEE 802.2 Local Area Networks, Logical Link Control (LLC)

IEEE 802.3 CSMA/CD 9 (ISO/IEC 8802-3)

IEEE 802.3i 10Base-T (ISO/IEC 8802-3, clause 14)

IEEE 802.3u 100Base-TX (ISO/IEC 8802-3, clause 25)

IEEE 802.3u 100Base-FX

IEEE 802.3z 1000Base-SX, 1000Base-LX

IEEE 802.3x Flow Control

EIA RS-232C (DTE-to-DCE)

EIA RS-310C (19" rackmount)

Regulatory Compliance

Safety: UL 1950, CSA C22.2 No 950, 73/23/EEC, EN 60950, IEC 950

Electromagnetic Compatibility (EMC): FCC Part 15, CSA C108.8, 89/336/EEC, EN 55022, EN 61000-3-2, EN 61000-3-3, EN 50082-1, AS/NZS 3548, VCCI V-3

Data Rate

10 Mbps Manchester encoded, 100 Mbps 4B/5B encoded, 1000 Mbps 8B/10B encoded.

Environmental Specifications

Operating temperature:	32° to 122° F (0° C to 50° C)
Operating humidity:	5 to 95% relative, non-condensing
Storage temperature:	-40° to 158° F (-40° C to 70° C)
Storage humidity:	5 to 95% relative, non-condensing

Electrical Specifications

Input voltage:	100-240 VAC
Input frequency:	50-60 Hz
Maximum power consumption:	80 VA

Physical Specifications

Height:	2.5 in. (6.4 cm)
Length:	11.2 in. (28.5 cm)
Width:	17.3 in. (44 cm mountable in a standard 19 in. rack)
Weight:	10.63 lb. (4.82 kg)

Port Specifications

Console Port

Table A-1 shows the console port pin assignments.

Table A-1. RS-232 Console Port Pin Assignments

Pin	Signal Name
1	DCD
2	RXD
3	TXD
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	RI

10Base-T and 100Base-TX Ports

Table A-2 shows the 10Base-T/100Base-TX pinouts. These ports are wired MDI-X. All undefined pins are not used.

Table A-2. 10Base-T/100Base-TX Pinouts

Pin	MDI-X Signal Name
1	RD+
2	RD-
3	TD+
6	TD-

MDI/MDI-X Crossover Cable Wiring

Figure A-1 shows the wiring scheme for implementing a crossover cable if needed for connection to the switch's 10Base-T or 100Base-TX ports. Such a cable may be required when connecting the switch to another switch or a hub device.
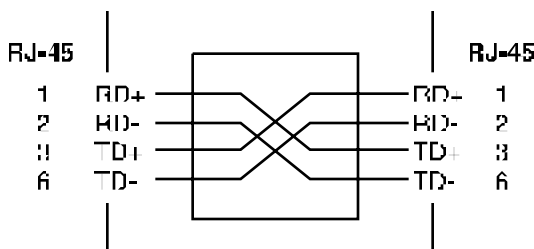
Figure A-1. External Crossover Cable Wiring

Power Cord Set Requirements

The wide-range input feature of the ELS100-S24TX2M Ethernet switch permits it to operate from any line voltage between 100 and 240 VAC.

The power cord set (appliance coupler, flexible cord, and wall plug) you received with the switch meets the requirements for use in the country where you purchased the switch.

Power cord sets for use in other countries must meet the requirements of the country where you use the switch. For more information on power cord set requirements, contact your Cabletron Systems Support Representative.

General Requirements

The requirements listed below are applicable to all countries:

- The length of the power cord set must be at least 5.00 feet (1.5 m) and a maximum of 6.56 feet (2.0 m).

- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be used.

- The power cord set must have a minimum current capacity of 10A and a nominal voltage rating of 125 or 250 VAC, as required by each country's power system.

- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with appliance inlet on the hub.

Country-Specific Requirements

Table A-3 lists the power cord set requirements by country and identifies the accredited agency within that country.

Table A-3. Power Cord Set Requirements by Country

Country	Accredited Agency	See Notes *
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	JIS	3
Netherlands	KEMA	1
Norway	NEMKO	1
Sweden	SEMKO	1
Switzerland	SEV	1
United Kingdom	BSI	1
United States	UL	2

* The note column includes a number. Associate this number with the corresponding notes listed after the table to obtain specific power standards and requirements.

Note 1

Flexible cord must be <HAR> Type HO5VV-F or HO3VV-F, 3-conductor, 1.0 mm^2, or 0.75 mm^2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.

Note 2

Flexible cord must be Type SV, SJ, SPT or equivalent, No. 18 AWG, 3-conductor. Wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A 250V) configuration.

Note 3

Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 0.75mm^2 conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (15A, 125V) configuration.

APPENDIX B. FLOW CONTROL

Flow control is a mechanism which allows you to protect the switch from overload conditions and to keep additional traffic off the network when excessive congestion will result. Figure B-1 illustrates flow control for both half and full duplex applications.
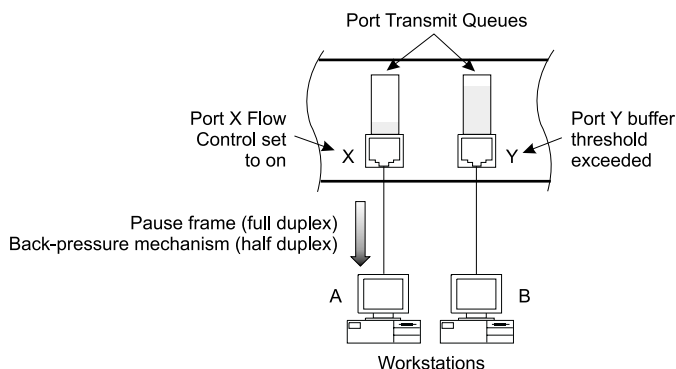
Figure B-1. Flow Control for Full and Half Duplex Applications

Each port of the switch has a transmit queue which buffers frames to be sent out on that port. In this example, large amounts of data are being sent from Workstation A (connected to port X) and other ports on the switch to Workstation B (connected to port Y).The queue on port Y starts filling up with data until it reaches a determined threshold. The packet which causes the threshold to be exceeded triggers the Flow Control function on the port from which the packet entered the switch, in this case port X.

Since port X is configured with Flow Control set to Enabled, the switch responds by initiating a pause frame (full duplex applications) or back-pressure mechanism (half duplex applications). The pause frame causes Workstation A to stop sending packets. After a certain amount of time has elapsed, determined by a value in the pause frame, Workstation A will resume sending data. Similarly, the back-pressure mechanism forces Workstation A to stop sending packets by inducing collisions on port X.

The pause frame flow control mechanism supported by the ELS100-S24TX2M switch conforms with the IEEE 802.3x specification for full duplex flow control.

For the full duplex pause frame mechanism to work, the device connected to the switch port must also support IEEE 802.3x flow control. Flow Control is configurable per port in the Port Configuration Menu of the console menus, using the on-board Web agent, or via SNMP.

APPENDIX C. ACRONYMS & ABBREVIATIONS

Term	Definition
10Base-T	10 Mbps twisted-pair Ethernet
100Base-TX	100 Mbps twisted-pair Fast Ethernet
100Base-FX	100 Mbps fiber option Fast Ethernet
1000Base-SX	1000 Mbps fiber option short-wavelength Gigabit Ethernet
1000Base-LX	1000 Mbps fiber option long-wavelength Gigabit Ethernet
ANSI	American National Standards Institute
BootP	Bootstrap Protocol
CAT5	Category 5
CRC	Cyclic Redundancy Check
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
DCE	Data Communications Equipment (modem)
DSR	Data Send Ready
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
ESD	Electrostatic Discharge
FCS	Frame Check Sequence
HTTP	Hypertext Transfer Protocol
ICMP	Internet Control Message Protocol
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
LAN	Local Area Network
MAC	Media Access Control
MDI	Media Dependent Interface
LED	Light Emitting Diode
MDI	Media Device Interface
MIB	Management Information Base
RFC	Request for Comment
RMON	Remote Monitoring
RXD	Receive Data

Term	Definition
SNMP	Simple Network Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial File Transfer Protocol
TXD	Transmit Data
UTP	Unshielded Twisted Pair
VLAN	Virtual LAN

INDEX

S

safety compliance, 29
SC ports, 28
screws, mounting, 19
SCSI II ports, 6
serial port
    connecting to, 22
    out-of-band management, 8
    pin assignments, 31
short-wavelength fiber interface, 26
single-mode fiber, 26, 28
site requirements, 17
slots for modules, 6
SNMP-based network manager, 9
software features, 3
software tests, 25
Spanning Tree Protocol, 7
stacking
    connecting switches, 20
    module features, 2, 6
    stack cables, 20
standards compliance, IEEE, 29
Status LEDs, module, 4
store-and-forward switching, 7
switch description, 1
switch ID, 4

T

TCP/IP protocol, 8
Telnet, 8, 23
terminal connection, 8, 22
tests, hardware and software, 25
TFTP download, 8
traffic priority, 11
transmit queues, 35
trunking, 11

U

unshielded twisted pair (UTP) cables, 26
upgrading software, 8

V

ventilation requirements, 18
VLANs, 11
VT100 connection, 8

W

Web-based network manager, 8
wrist strap, 21

X

XMODEM download, 8, 25